AKKAYA HEATING INSTRUMENTS MANUFACTURING AND TRADE INCORP.

SBK-YSB-HYB MODEL STEAM BOILERS USER MANUAL

TYPE : **BOILER**
MARK: **AKKAYA - BLOWTHERM**
MODEL: **SBK - YSB - HYB**
SUB-MODEL: **STEAM BOILER**

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AKKAYA STEAM BOILERS

Valuable Customer,

The Akkaya steam boıler whıch you have bought are produced in Turkısh Norm (TS 497 And TS 377 are applied for designed pressure 0,6 - 2,5 Mpa) The boilers have ten years life time that is determined by The Industry and Commercial Ministry . This user guide is prepared for AKKAYA YSB-SBK AND HYB Type Boiler's.

The user guide has also technical specifications of the boilers.

Customer should employe a licensed or certificated boiler opretator for safe and efficient use of the boiler. Its customer's responsibilty to avoid any kind of use of boiler which will cause acciedents.

YSB MODEL FIREBOX TYPE STEAM BOILERS TECHNICAL SPECIFICATIONS

Type : Three pass wet back,low pressure,fıre box type
Furnace - Reverse Chamber: It is produced from the steel materials
it is strengthen wıth extra reinforcement.
Refrracter Materials: It is used for supplying completely burning
in the furnace and reverse chamber
Materials : Carbon steels as described in standards
Pipes : Carbon steel tubes as indicated in standards.
Welding Quality: It is done by certificated welder according to
EN 288 ,EN287-1
Fuel Type : Solid - Liquid - Gas

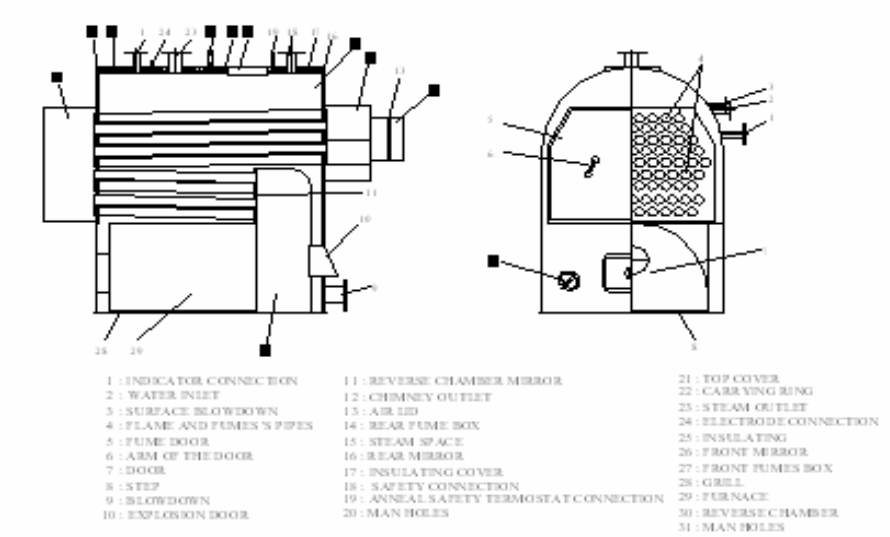

1 : INDICATOR CONNECTION
2 : WATER INLET
3 : SURFACE BLOWDOWN
4 : FLAME AND FUMES 'S PIPES
5 : FUME DOOR
6 : ARM OF THE DOOR
7 : DOOR
8 : STEP
9 : BLOWDOWN
10 : EXPLOSION DOOR
11 : REVERSE CHAMBER MIRROR
12 : CHIMNEY OUTLET
13 : AIR LED
14 : REAR FUME BOX
15 : STEAM SPACE
16 : REAR MIRROR
17 : INSULATING COVER
18 : SAFETY CONNECTION
19 : ANNEAL SAFETY TERMOSTAT CONNECTION
20 : MAN HOLES
21 : TOP COVER
22 : CARRYING RING
23 : STEAM OUTLET
24 : ELECTRODE CONNECTION
25 : INSULATING
26 : FRONT MIRROR
27 : FRONT FUMES BOX
28 : GRILL
29 : FURNACE
30 : REVERSE CHAMBER
31 : MAN HOLES

Fig. 1. : Fire box type steam boiler

CAPACITY AND DIMENSIONS

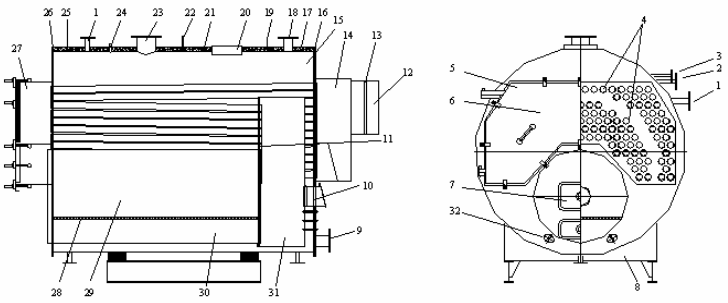
Model	Steam Capasity kg/h			Total Lenght	Width	Hight
	Ort.	Max	Katı Yakıtlı	mm	mm	mm
5	200	250	150	1700	800	1600
10	400	500	300	2100	800	1600
15	600	750	450	2500	950	1600
20	800	1000	600	2080	950	1600
25	1.000	1250	750	2410	1130	2000
30	1.200	1500	900	2340	1130	2000
35	1.400	1750	1.050	2595	1450	2215
40	1.600	2000	1.200	2825	1450	2215
45	1.800	2250	1.350	3055	1450	2215
50	2.000	2500	1.500	3285	1450	2215
55	2.200	2750	1.650	2980	1580	2625
60	2.400	3000	1.800	3150	1580	2625
65	2.600	3250	1.950	3300	1580	2625
70	2.800	3500	2.100	3450	1580	2625
75	3.000	3750	2.250	3600	1580	2625
80	3.200	4000	2.400	3750	1580	2625

Changing capasity and dimensions of the boiler belongs to us.

Table 1. : Fire Box Type Steam Boiler's Dimensions AND Capacity

SBK MODEL - SCOTCH TYPE 3 PASS BOILERS TECHNICAL SPECIFICATIONS.

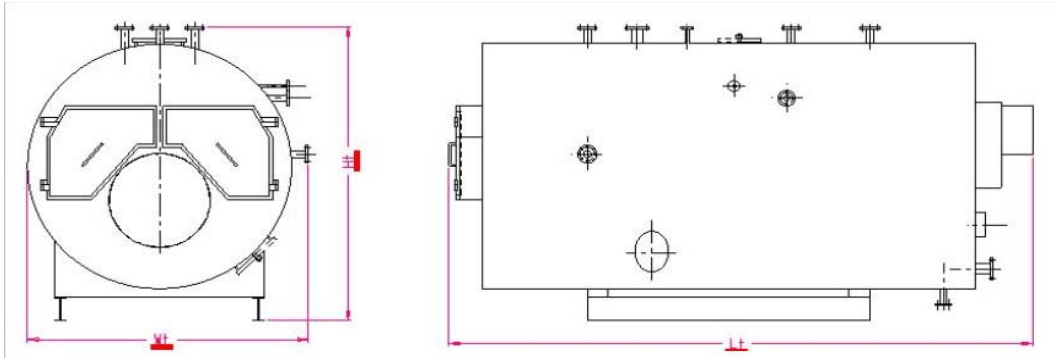
Type :	Three pass wet back,low pressure, scotch type
Furnace - Reverse Chamber:	It is produced from the steel materials
Refrracter Materials:	It is used for supplying completely burning in the furnace and reverse chamber
Materials :	Carbon steels as described in standards
Pipes :	Carbon steel tubes as indicated in standards.
Welding Quality:	It is done by certificated welder according to EN 288 ,EN287-1
Fuel Type :	Solid - Liquid - Gas



1 : INDICATOR CONNECTION
2 : WATER INLET
3 : SURFACE BLOWDOWN
4 : FLAME AND FUMES PIPES
5 : FUME DOOR
6 : ARM OF THE BOILER
7 : DOOR
8 : CARRYING LEG
9 : BLOWDOWN
10 : EXPLOSION DOOR
11 : REVERSE CHAMBER MIRROR
12 : CHIMNEY OUTLET
13 : AIR LID
14 : REAR FUME BOX
15 : STEAM SPACE
16 : REAR MIRROR
17 : INSULATING COVER
18 : SAFETY CONNECTION
19 : ANNEAL SAFETY TERMOSTAT CONNECTION
20 : MAN HOLES
21 : TOP COVER
22 : CARRYING RING
23 : STEAM OUTLET
24 : ELECTRODE CONNECTION
25 : INSULATING
26 : FRONT MIRROR
27 : FRONT FUMES BOX
28 : GRILLS
29 : FURNACE
30 : ASH SPACE
31 : REVERSE CHAMBER
32 : HAND HOLES

Fig. 2. :Scoth Type Steam Boiler

CAPACITY AND DIMENSIONS - FOR OIL/GAS FIRED BOILERS



Model	Heat Transfer Surface m2	Steam Capacity kg/h (F&A 100C)	Full Water Volume	Total Length mm (Lt)	Width mm (Wt)	Heigth mm (Ht)
SBK-08	8 m2	320 kg/h	900 lt	2100 mm	1410 mm	1650 mm
SBK-10	10 m2	400 kg/h	1160 lt	2400 mm	1410 mm	1650 mm
SBK-15	15 m2	600 kg/h	2400 lt	2500 mm	1880 mm	2100 mm
SBK-20	20 m2	800 kg/h	3100 lt	3000 mm	1880 mm	2100 mm
SBK-30	30 m2	1200 kg/h	4000 lt	3200 mm	2160 mm	2400 mm
SBK-40	40 m2	1600 kg/h	4900 lt	3800 mm	2160 mm	2400 mm
SBK-50	50 m2	2000 kg/h	6200 lt	3900 mm	2400 mm	2600 mm
SBK-60	60 m2	2400 kg/h	7400 lt	4400 mm	2400 mm	2600 mm
SBK-70	70 m2	2800 kg/h	8500 lt	4900 mm	2400 mm	2600 mm
SBK-80	80 m2	3200 kg/h	10800 lt	4770 mm	2600 mm	2900 mm
SBK-90	90 m2	3600 kg/h	12000 lt	5170 mm	2600 mm	2900 mm
SBK-100	100 m2	4000 kg/h	13300 lt	5570 mm	2600 mm	2900 mm
SBK-125	125 m2	5000 kg/h	12300 lt	5100 mm	2700 mm	3020 mm
SBK-150	150 m2	6000 kg/h	14500 lt	5800 mm	2700 mm	3020 mm
SBK-175	175 m2	7000 kg/h	17100 lt	6000 mm	2950 mm	3200 mm
SBK-200	200 m2	8000 kg/h	19500 lt	6650 mm	2950 mm	3200 mm
SBK-250	250 m2	10000 kg/h	22000 lt	6900 mm	3100 mm	3500 mm
SBK-300	300 m2	12000 kg/h	25000 lt	7200 mm	3100 mm	3500 mm
SBK-350	350 m2	14000 kg/h	27000 lt	7400 mm	3400 mm	3700 mm

We keep right to change the dimensions and the models

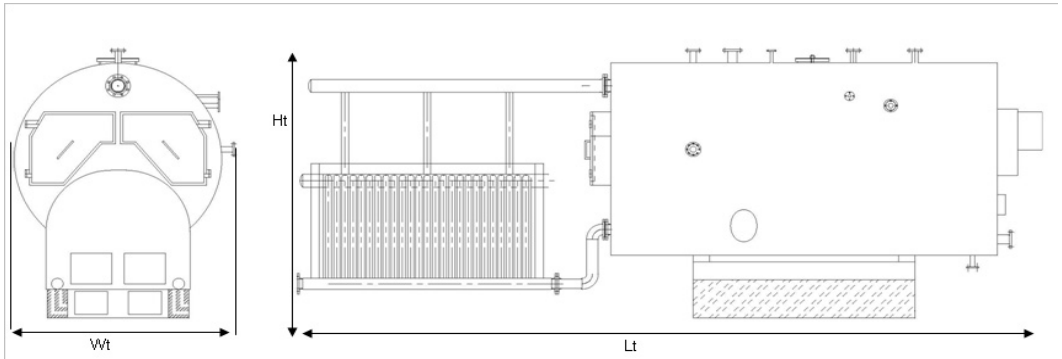
HYB MODEL - HYBRID TYPE BOILERS TECHNICAL SPECIFICATIONS

Type : Water tube combustion chamber + 2 or 3 pass boiler
Furnace - Reverse Chamber: It is produced from the steel materials
Refrracter Materials: It is used for supplying completely burning in the furnace and reverse chamber
Materials : Carbon steels as described in standards
Pipes : Carbon steel tubes as indicated in standards.
Welding Quality: It is done by certificated welder according to EN 288 ,EN287-1
Fuel Type : Solid - Liquid - Gas

3 pass back boiler specifications are same with SBK models

A front chamber made of water tubes are attached in order to get sufficient combustion chamber volume and tuyer area

CAPACITY AND DIMENSIONS



Model	Isıtma Yüzeyi m2	Min 5500 kcal/kg Katı Yakıtta Buhar Kapasitesi kg/h (F&A 100C)	Kazan kısmı Tam Dolu Su Hacmi	Toplam Boy mm (Lt)	Genişlik mm (Wt)	Yükseklik mm (Ht)
HYB 50	40+10=50 m2	1000 kg/h	4900 lt	6300 mm	2160 mm	3000 mm
HYB 60	50+10=60 m2	1200 kg/h	6200 lt	6400 mm	2400 mm	3000 mm
HYB 75	60+15=75 m2	1500 kg/h	7400 lt	7000 mm	2400 mm	3200 mm
HYB 85	70+15=85 m2	1700 kg/h	8500 lt	7500 mm	2400 mm	3200 mm
HYB 100	80+20=100 m2	2000 kg/h	10800 lt	7800 mm	2700 mm	3500 mm
HYB 125	100+25=125 m2	2500 kg/h	13000 lt	9000 mm	2700 mm	3500 mm
HYB 150	125+25=150 m2	3000 kg/h	15000 lt	9200 mm	2800 mm	3600 mm
HYB 175	150+25=175 m2	3500 kg/h	17000 lt	9700 mm	2800 mm	3600 mm
HYB 200	150+50=200 m2	4000 kg/h	17000 lt	9700 mm	2800 mm	4200 mm
HYB 250	200+50=250 m2	5000 kg/h	20000 lt	9500 mm	3200 mm	4500 mm

Modellerde ve Ölçülerde değişiklik yapma hakkımız saklıdır.

Capacities for min. 5500 kcal/kg solid fuel and F&A 100 C (from and at 100 C)

PERCAUTIONS DURING CARRYING AND TRANSPORT

A.) SETTING BOILERS ON VEHICLE

While boiler is setting on vehicle ,crane must be used .

The covers of the vehicle body must be opened before boiler is setted on it You must use carrying circle during transporting boiler with crane.
You attached the hook of crane bom's to the boiler's carrying circle.
You must be sure safety of hook's pim .You discharge vacuum of bom by raising up bom of crane slowly.You lift up the boiler slowly but the bottom of the boıler must be high 30 - 40 cm from surface of the vehicle.

You avaoid sudden acts wıll cause shakıng the boiler.You should carry the boiler this by near to the vehicle.After taking away the boiler near to the vehicle, raise up the boiler 30 - 40 cm higher than the vehicles 's body level and lower the boiler on vehicle body.

Take of the hook of the crane from carryıng circle of the boiler.

ATTENTION : The boiler must be carried using carrying circle in perpendicuar position.When you lift up the boiler by crane ,there must be no one under the boiler The boiler can be transported wıth all of ıts accessories.

B.) TRANSPORTING BOILER ON VEHICLE

When the boiler is being carried by vehicle it must be tied with barriers which protect from slipping .The boiler shoul not be carried with fragile materials and living creature.After setting the boiler on the vehicle ,boiler must be covered wıth canvas.

The driver of the vehicle must avoid sudden movements that wıll cause any danger.

C.) SETTING DOWN THE BOILER TO BOILER HOUSE

Boiler shouln't be settled ın dwelling and working areas .It must be settled to a special room ,again crane must be used .You must take into consideration topic A If it is impossible to bring crane to the boiler room ,you can land the boiler to appropriate place than it be carried by instruments rollers on.

ASSEMBLING AND CONNECTING

ASSEMBLING AND CONNECTING OF FIREBOX TYPE STEAM BOILERS

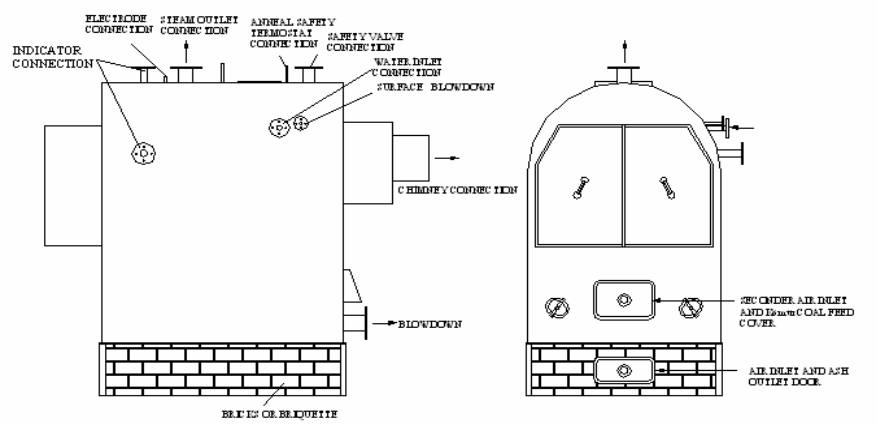


Fig. 3 : Assembling of fire box steam boiler with solid fuel

Fitting up steam boiler ,lifting up the boiler on it is carrying legs and chimney connectings are done by qualified service ,attaching safety and control instruments to the boiler, connecting existing installations and building brick around carrying. Legs ,building similiar services cant be made by qualified service company.

The height of boiler room must be 2 m higher than the boiler 's height. There must be 1 m space between the boilers .There must be distance in front of the boiler at least as much as itself lenght .There must be at least two doors facing each other .One of them must have ventilation to let to the boiler room.

These doors must be 2 m height and 0.6 m width.These doors must be divided from other places.The boiler room must be ventilated.Pressure decrase can be max. 0.5 mbar in the boiler room.

There must be wall opening to the air and this wall must be as much as %10 floor area of the boiler room.
The boiler must be jacked up from at least two points of the boiler.
The legs must be welded as seen in fig.3 and legs are raised up 30-40 cm from surface Air inlet door and ash discharge door which are given with the boiler to the customer are settled under the front of boiler as seen in figure ,they are built with bricks and

briquette without letting any air leakage.Side section and backside of the boiler are being built with brick and briquette as seen the figure to make ash space.
The place where the furnace and reverse chamber is attached (fig 1) ,must be built by fire bricks.It is height must be as much as explotion doors height.

If the boiler will be used with solid fuel or gas fuel ,concrete step must be spilled as we make scotch type boiler to the place where the boiler wıll land and the boiler must be setted on this concrete step.A hole which the barrel of burner can enter in ,is drilling on the door of coal inlet.Appropriate parts of assemblying are done on the connecting flange of the burner.

CONNECTION OF SCOTCH TYPE OF STEAM BOILER

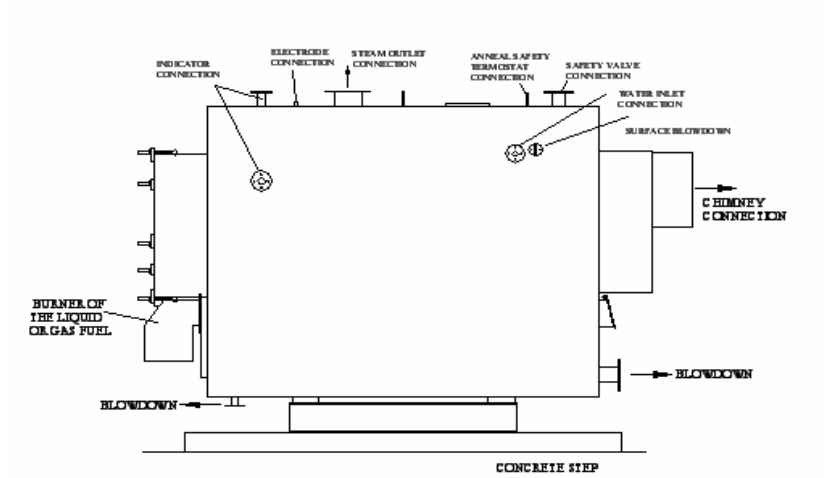


Fig 4 : Connection of scotch type steam boiler

Fitting up steam boiler and chimney connecting must be done by qualified service.
Attaching safety and control ınstruments connectings existed ınstallition.
Similiar services are made by recommended company by qualified service.

The height of the boiler 2m higher than the boiler height.
1 m distance must be between boilers and at least 1 m distance from side wall of the boiler There must be at least two doors facing each other .one of them must have ventilation to let to the boiler room.

These doors must be 2 m height and 0.6 m width.These doors must be divided from other places.The boiler room must be ventilated.Pressure decrase can be max. 0.5 mbar in the boiler room.

Concrete step must be done in appropriate dimensions to the place where landing boiler and the boiler must be placed there.
A hole which the barrel of the burner can enter in ,is drilling on the door of coal
Appropriate parts of assemblying are done on the connecting flange of the burner.
boiler and the boiler must be placed there.

Burner must be fitted up by these parts.

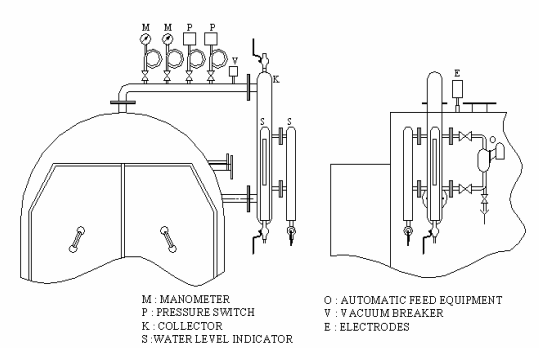
CHİMNEY CONNECTION

Boiler must be connected chimney by connecting parts which have the same dimensions of stack connection of the boiler.
The distance between chimney and the boiler must be less than 3m.If it is possible
If you have to use elbow ,you cant use more than two elbows .

Becareful about sharp turning because tar can be formed ın the chimney by by chimney fumes pipe.Too long chimney connection pipes in horizantal section cause poor draft of chimney because of quick cooling .Chimney draft is very is important for the burning quality .The diameter of chimney must be in appropriate dimensions for your boiler.

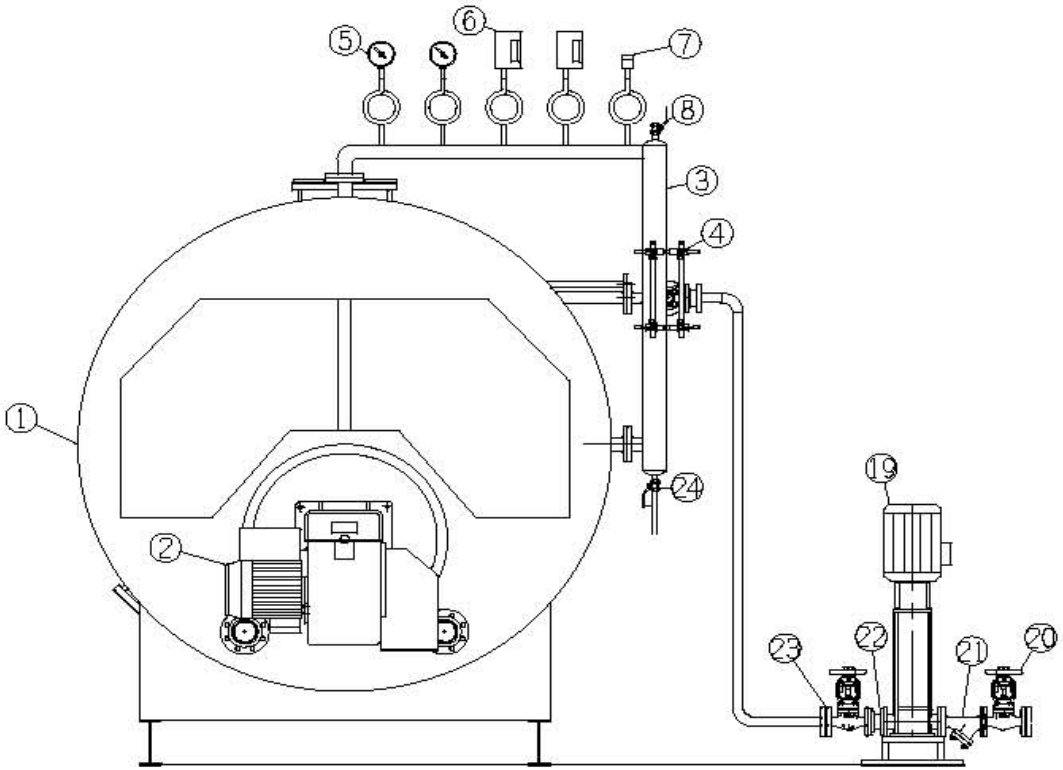
ASSEMBLİNG ACCESSORIES OF STEAM BOİLER

All accessories must have the specifications and quantities as inidicated in norms and standards



The faıilures caused by the accessories provided by the customer is not at our responsibility and guarantee conditions do not apply.

Fig. 5 : Accessories Of Steam Boiler



FRONT VIEW

1	STEAM BOILER	15	WATER INLET CHECK VALVE (DN40)
2	BURNER	16	BLOWDOWN SHUTOFF (DN40)
3	BOILER CONTROL HEADER	17	BLOWDOWN BALL VALVE (DN40)
4	LEVEL INDICATORS - 400 mm (2PCS)	18	GAS EXPANSION DOOR
5	MANOMETERS (2PCS)	19	FEED WATER PUMPS (2PCS)
6	PRESSURE SWITCHES (2PCS)	20	PUMP INLET VALVES-DN40 (2PCS)
7	PRESSURE TRANSMITTER	21	PUMP STRAINERS-DN40 (2PCS)
8	CONTROL HEADER AIR VENT	22	PUMP CHECK VALVES-DN40 (2PCS)
9	STEAM EXIT VALVE DN125	23	PUMP EXIT VALVES-DN40 (2PCS)
10	LEVEL CONTROLLER-on/off+alarm	24	CONTROL HEADER DRAIN VALVE
11	LEVEL CONTROLLER-on/off+alarm	25	TEMPERATURE PROBE
12	SAFETY VALVES-DN40/65 (2PCS)	26	BOILER CONTROL PANEL
13	SURFACE BLOWDOWN (DN25)		
14	FEED WATER INLET VALVE (DN40)		

Akkaya A.S keeps the right to change the drawing and its details anytime

AKKAYA Blowtherm	Description	Steam boiler room layout with stack connection detail
AKKAYA ISI MAKINALARI SANAYI VE TICARET A.S.	Date	30.05.2008

Fig. 6 (This is only for sample, Akkaya A.Ş keeps the rigth to make any changes)

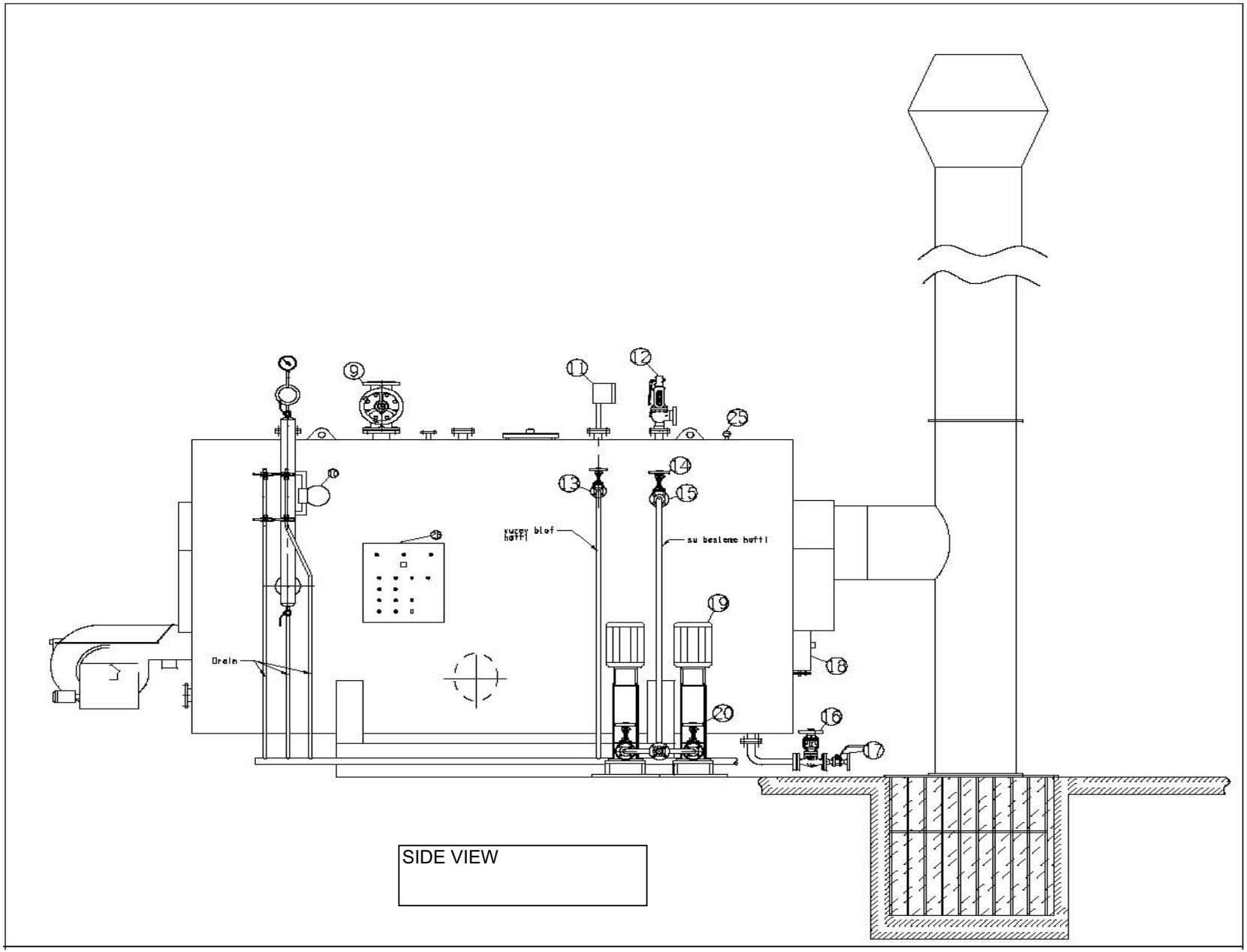


Fig. 7 (This is only for sample, Akkaya A.Ş keeps the rigth to make any changes)

Pressure Switch : It must be two quantities on the boiler .One of them is for limit pressure switch .It stops burner ın case of alarm.

Other one ıs pressure adjusment switch.If you use two stages systems ,you must use three pressure switchs.
The most important point of choosing pressure switch is that adjustment pressure of ıts must be in the mıddle of working range.

It is perferred that differation musnt be more than % 10 working pressure.

Manometers : Cheeking manometers also must be two quantities .It is used for pressure of boiler.Working pressure in manometers must be approximately as much as 3/4 equipment design pressure value.

Automatic Water Feed Equıpment Of Boiler :
When adjusted water level reduce ın the boiler this eqipments provides feeding water in the boilerby using feed pumps and it provides the same level on water.
It is the most important safety and control instruments on the boiler.It is in two type ,one of them is with float mechanism,other one has contact is preferred.

In the boiler ,even you choose feed equipment with float mechanism,your limit level control equipment must be equiped with liquid contact.

Water Level Electrode Of The Boiler:
It is used for controlling water level (shown in fig.3)
It is assembled.

Water Level Indicators :
There are two pieces water level indicator in the boiler.
It has three kinds with steel body and magnetic type.

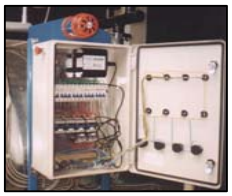
Vacuum Breaker :
It is used for preventing vacuum in the boiler.

Safety Valves : It can be with spring or weight.ıt must be used two quantities on the boiler.One of them can be with spring other one can be with weight .
Both of safety valves can be attached on the safety connecting mouth of the boiler.
materials can be steel or special casting.They must be dimensioned in that way when safety valves opened no pressure increas in the boiler must occur.

Safety valve must be opened to any safe place and out of the boiler by a pipe with bigger diameter.
Certainly there musn't be any valve around safety valves exit and inlet.

Safety valve must be chosen to discharge the steam when boiler is at its maximum capacity without increasing % 6 of maaximum working pressure.Safety valve must adjusted to valve %10 higher than working pressure. All valves should be CE certificated

Equipment Of The Boiler:
Main steam discharge pipe dimension should thi same with the exit valve dimension of the boiler. There must be check valve and a closing valve inlet of feed water boiler.Surface blowdown is used for regulationg salt concentration of boiler.
Blowdown valve is used for throwing away mud,sediments,dirts from boiler.
Blow down process can be done manually.



Control board and alarm system
there must be an electricalcontrol board equiped with feed water syst em of boiler ,safety system and protection Party on alarm system of boiler,
1) Maximum pressure system and alarm
2)Minumum water level and alarm
3)Boiler must include furnace over heat safety adn alarm

NOT E: 1.Preparing of installion depends on using steam of boiler.And adgustment assembling of instruments of boiler must be done by qualifed service company.

2. Do not charge the adjusmtments of equipments and do not allow people unauthorized operase the boiler.

BOILER OPERATION

Boiler operators are responsible of interfering in any urgnt situation. The most important point, operators must know the principles of all equipments,property of working, pressure, temperature and flowrates must be known by the operator. They must know all control circuit,measurement equipments function and working at electrical protect circuit very well.

BOILER OPERATOR MUST HAVE A VALID LICENCE OR CERTIFICATE
Operating boiler without licensed or certificated operator makes the guarantee invalid.

There must be an boiler operating note book and it must be filled daily. There is a sample daily control table (Table 4).
This table must be filled daily if the controls are not done periodically and this notebook is not filled regularly guarantee is not valid.

GETTING STARTED WITH BOILER AND FIRST START UP

* All equipments of chimney draft system and burning equipments must be working correctly ,all dompersmust be fixed both opening and closing easily.

* If there are automatical burning system or any other automatical controls,all of adjustments tests,caliberations of this systems must be controlled. Tests,adjusments and functions controls of electrical protection and locking system must be done and all equipments of system must be existed in working condition

* All blowdowns,discharging valves,level indicator discharcing volves,feed water manuel vaves and control valves must be checked and must let no leakage.

AKKAYA BUHAR KAZANI GÜNLÜK KONTROL ÇİZELGESİ

GÜNLER		Kazandaki Su Seviyesi	Buhar Basıncı	Besi Pompası Basıncı	Besi Suyu Sıcaklığı	Kondens Tankına Buhar Kaçağı	Baca Gaz Sıcaklığı	Aşşağı Su Seviye Dümatığı Kontr	Seviye Göstergesi Camı Kontr	Kondens Tankında Yeterli Su Var	Besi Suyu Sertliği	Besi Suyu PH Değeri	Dış Bükü Yapıldı mı?	Yüzey Bükü Yapıldı mı?	Görevli Operatörün İmzası	DÜŞÜNCELER
Pazartesi	Sabah															
	Akşam															
Salı	Sabah															
	Akşam															
Çarşamba	Sabah															
	Akşam															
Perşembe	Sabah															
	Akşam															
Cuma	Sabah															
	Akşam															
Cumartesi	Sabah															
	Akşam															
Pazar	Sabah															
	Akşam															

Yılı .. ..
Haftası
Kazan No
Tarih
Yetkili İsim
İmza

Tablo 4. :Örnek Buhar kazanı günlük kontrol çizelgesi
Bu tablo çoğaltılarak bir işletme defteri oluşturulmalı ve düzenli doldurularak muhafaza edilmelidir.
Tablodaki kontrol süreleri ve sıklığı işletme şartlarına göre revize edilmelidir.

* If there is an automatical controling of water level,all of adjusments,tests, caliberations and inspections of function of this control system must be done and it must be proved to work correctly.

* Be sure whether water level indicators are working or not,

* If steam boiler is out of service for a long time,before starting ,all inspectetions must be done and all lomeness must be eliminated.

* ***Water must be filled in boiler in appropriate checimal condition. EN12953-10***

The boiler feed water composition must be as indicated in Table 5-1 & 5-2. Otherwise guarantee is not valid.

* The water given to the boiler musn't be cold .The temperature difference of water and boilers metal sufface must not exceed 10C°.

* Water feed must be stopped after filling the boiler, check whether there is any blockage or not in the pipes and valves and boiler must be discharged by discharcing valve.

* If the boiler is not connected to main steam pipe by only one valve ,steam discharge valve must be controlled by opening and closing. This valve must not be tigthened very much while supplying steam, considering enlargement and explosion of it.

* Main steam pressure indicator must be inspected and calibrated.

Fuel and Air adjusment must be done with on exhaust gas analyser and it must be done by experts.In practically ,flame colour and exhaust gas colour are used to make adjusment of mixture of air and fuel.

If the flame colour is light yellow and the exhaust gas is colourless it means of air is high.

If there is not burning or flame length is short and exhaust gas colour is dark,quantity at air is little .

It is preferred to have an orange coloured flame.Flame and exhaust gas must be controlled continuasly.

* First Flame when you ignite the boiler firstly must be little according to the equipments capacity.

The most little flame, at least one hour,must be kept up by not making it bigger.

* Kazanınızı katı yakıtlı olarak kullanıyorsanız,yakacağınız kömür, portakal

Coal must be spread on coal grill from coal inlet door.

Pieces of wood and fire wood must be spread over the coal.

Burning should be proved by locating paper,oaku,resinous wood among pieces of wood.

Boiler must be ignited from side up.If you ignite from bottom side,both coal flying particules are discharced and causes air pollution b burning the same ratio while consuming %20-30 more coal.

Coal food door must be closed after burning boiler and it must keept close.

During the first burning air inlet door and secondary air inlet on the coal feed door must be open

Air inlet door,secondary air inlet and airdamper must be adjisted by keeping up first little flame

You must not completely close air dampers and doors that getting air enter and air exit.

Not to let flying particules in coal go to air and not to cause or pollution ,new coal must not add on to the burning coal.

When you want to feed coal in the boiler ,you must pour ashes with pioner tool to ash room you shoud feed coal to toiler by putting new coals on the side grill .After that new coals must be ….. In touch the burning coals.So that can fired to support enough air for burning in your boiler,extremely ash massing must be prevented

* Water level must be kept stable by making blowdowm from time to time Water level rise because of heating of the boiler water.

* After obtaining homogenuos heat inside the boiler, flame can be enlarged and the pressure. of the boiler can be increased, the time for increasing the boiler pressure must be according to boilers capacity. Quick pressure rises must be avoided.

* Safety valve must be controlled

* Water level indicators,mantoles and inspection door,must be controlled occasionally and if there is leakage ,it must be eliminated.

When leakages occur at high pressures and temperatures do never attemp to eliminate, wait for the boiler to cool down than take out those parts from system.

BOILING

Boiler must be boiled with chemical cleaner and alkali detergent for cleaning the dirt,rust filth on the water surface of newly sotted boiler or repaired boiler because of contacting high pressure.

You must get out water level indicator during boiling and you must put on temporary glass because of preventing water level indicator from dirt after finishing boiling,you must put on water level indicator in its place.

Quantity and Kinds of materials used for boiling must be like this;

For pertone of boiler water

2 kg sodium carbonate

2 kg trisodium phosphate

1 kg sodium hdyroxide

Çizelge 5.1 – Feed water for steam boilers and warm water boilers

Parameter	Unit	Feed water for steam boilers		Feed water for warm water boilers
Working pressure	bar (= 0,1 MPa)	> 0,5 – 20	> 20	Total interval
Appearance	-	Must be clean and not involve suspended materials		
Direct conductivity @ 25 C	µS/cm	Not indicated check Table 5.2		
Total Ph @ 25 C - a	–	> 9,2[b]	> 9,2[b]	> 7,0
Total hardness (Ca+Mg)	mmol/L	< 0,01[c]	< 0,01	< 0,05
Iron (Fe) concentration	mg/L	< 0,3	< 0,1	< 0,2
Copper (Cu) concentration	mg/L	< 0,05	< 0,03	< 0,1
Silisiumdioxide (SiO2) concentration	mg/L	Not indicated check Table 5.2		–
Oxygen (O2) concentration	mg/L	< 0,05[d]	< 0,02	–
oil / grease concentration (EN 12953-6)	mg/L	< 1	< 1	< 1
Organik maddeler (TOC olarak) konsantrasyonu	–	Dip not [e]		

[a] Sistemdeki bakır alaşımları için pH değeri 8,7 ilâ 9,2 aralığında tutulmalıdır.

[b] pH değeri 7,0'den büyük olan yumuşatılmış suda Çizelge 5.2'ye göre kazan suyunun pH değeri dikkate alınmalıdır.

[c] 1 bar'dan küçük çalıştırma basınçlarında en yüksek 0,05 mmol/l'lik toplam sertlik kabul edilebilir.

[d] Kesintili çalışmada veya gaz alma cihazı olmadan çalışmada bu değeri gözlemlemek yerine film oluşturan maddeler ve/veya aşırı oksijen giderici kullanılmalıdır.

[e] Organik maddeler, genelde çeşitli farklı bileşiklerin bir karışımıdır. Bu karışımların bileşimini ve bunların münferit bileşenlerinin davranışını kazanın çalışma şartları altında tahmin etmek zordur. Organik maddeler, asit iletkenliğini artıran ve korozyon veya birikintilere neden olan karbonik asit veya diğer asidik ayrışmış ürünler oluşturmak için ayrışabilir. Bunlar, aynı zamanda, mümkün olduğunca düşük seviyede tutulması gereken köpüklenme ve / veya ateşlemeye neden olabilir.

Check EN12953-10 EN version for detailed information

Çizelge 5.2 – Water for steam boilers and warm water boilers. (Water in the boiler

Parameter	Unit	Water for steam boilers			Water for warm water boilers
		Feed water direct conductivity > 30 µS/cm		Feed water direct conductivity iletkenliği ≤ 30 µS/cm	
Working pressure	bar (= 0,1 MPa)	> 0,5 – 20	> 20	> 0,5	Total interval
Appearance	–	clean, no direct foam			
Direct conductivity @ 25 C	µS/cm	< 6 000[a]	Şekil 5.1[a]	< 1 500	< 1 500
Total Ph @ 25 C - a	–	10,5 – 12,0	10,5 – 11,8	10,0 – 11,0[b,c]	9,0 – 11,5[d]
composite alkaline	mmol/L	1 – 15[a]	1 – 10[a]	0,1 – 1,0[c]	< 5
Silisiumdioxide (SiO_2) concentration	mg/L	basınca bağımlı, Şekil 5.2'ye göre			–
phosphat (PO_4)	mg/L	10 – 13	10 -30	6 – 15	–
Organik maddeler	–	Dip not [f]			–

[a] Süper ısıtıcıda gösterilen üst değerin % 50'si en yüksek değer olarak düşünülür.

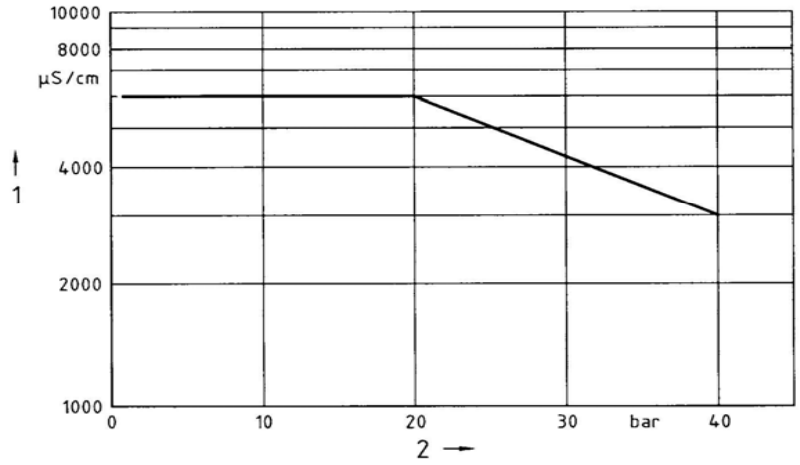
[b] Na_3PO_4 enjekte ederek temel pH ayarlaması, ilâve NaOH enjeksiyonu sadece pH < 0 ise yapılır.

[c] Kazan besleme suyunun asit iletkenliği < 0,2 µS/cm ve Na + K konsantrasyonu < 0,010 mg/l ise fosfat enjeksiyonu gerekmez. Bu şartlar altında AVT (bütün uçucu işlem, besleme suyu pH değeri ≥ 9,2 ve kazan suyu pH değeri ≥ 8,0) uygulanabilir, bu durumda kazan suyunun asit iletkenliği < 5 µS/cm'dir.

[d] Sistemde demir dışı (örneğin alüminyum) malzemeler mevcutsa, bunlar düşük pH değeri ve doğrudan iletkenlik gerektirebilir, ancak kazanın korunması önceliklidir.

[e] Koordineli fosfat işlemi kullanılırsa, bütün diğer değerleri dikkate alarak PO_4-konsantrasyonları kabul edilebilir (Madde 4'e de bakılmalıdır).

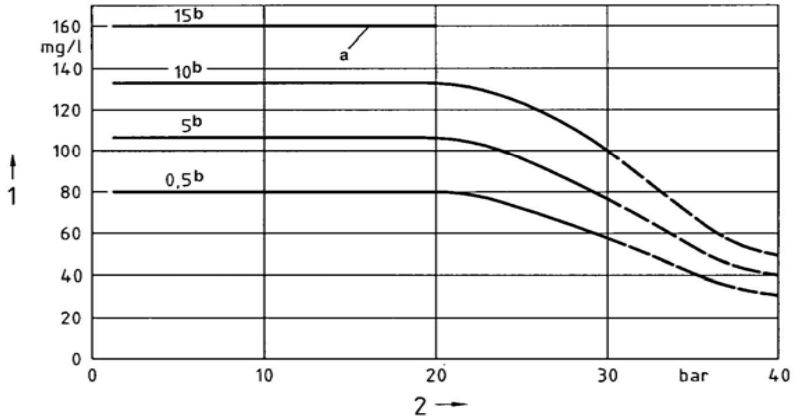
[f] Çizelge 5.1, e dipnotu.



Açıklama
1 Direct conductivity
2 Working Pressure

Acceptable direct conductivity of the boiler water versus operating pressure
Feed water direct conductivity > 30 mS/cm

Şekil 5.1 – Basınca bağlı olarak kazan suyunun en yüksek kabul edilebilir doğrudan iletkenliği; besleme suyu doğrudan iletkenliği > 30 µS/cm



Açıklama
1 Highest alowable SiO2 content
2 Working Pressure

Acceptable SiO2 content of the boiler water versus operating pressure

a) 20 bar üzerinde bu seviyede alkaliliğe müsaade edilmez
b) mmol/L olarak alkalilik

Şekil 5.2 – Basınca bağlı olarak kazan suyunun en yüksek kabul edilebilir silis muhtevası (SiO_2)

During using this checimal materials,personnel must wear rubber gloves ,rubber shoes,glasses and uniform.

Water must be taken to the boiler until normal level.

Chemical materials must be added in the boiler water after words the chemical materials melts.Synthetic detergent without no foam must be mixed at sufficient quantity to the these chemical materials.

The doors must be closed and it must be ignited with the smallest flame and must be boiled after words the chemical materials and the detergent is added to the boiler. The boiler pressure must be increased to the pressure of the system and during boiling it must be stable at the same level.After that water must be taken untill normal levelby making blowdown as much as half of the water level indicators.The sample must be taken from the boiler water and must be analysed frequintly until water become clean.The boiler must be discharced and must be washed by pressurized waer,dirths,sediments must be cleaned.

STARTING THE BOILER

* After the boiler produces steam,you must do blowdown by opening blowdown valf at the back of the boiler.
* Surface blowdown must be done by using surface blowdown .
* Some water must be discharged by valves under the level indicators.
* Steam must be discharged by raising a little the handle of safety valves.

* This process must be done at least twice a day and must be recorded The blowdown quantity may vary according to boiler capacity.
* If there is an another boiler that gives steam to the steam system,while the Boiler is joining in the circuit by reaching pressure of system,the steam in the boiler must be prevented to contact the steam in the circuit and all condensated pipes of the boiler.
* If there is no other boiler that gives steam to the steam system,the system must be heated external system prossure must be raised with the boiler pressure
* If there is an steam exit valve on the boiler this valve must be open slowly with highest attention
* IF THE WATER LEVEL IS LOW BOILER MUST NOT BE OPERATED.
* IF THE BOILER OR ANY EQUIPMENT IS FROZEN DO NEVER FIRE OR RESTART THE BOILER BEFORE HAVING THE AUTHORIZED ASSOCIATION MAKE THE NECESSARY CHECK. NEVER MELT THE BOILER BY FIRING IT. BOILER CAN EXPLODE.
* IF THERE IS NOT SUFFICIENT WATER IN THE BOILER NEVER FEED THE HOT BOILER WITH WATER. IF YOU DO SO BOILER WILL EXPLODE

OPERATING THE RUNNING BOILER

A) FLAME

It is not important that what kind of fuel is used, flame must be rather smooth and stable.

B) WATER LEVEL

Water level must be stayed required level during the boiler is working. Water level can be controlled automatically.

However ,water level must be controlled by boiler operator because automatical equipments can be broken.

Water level equipments at least must be cleaned per month in order to work efficiently.Also level electrodes must be kept clean.

C) FOAM

Water level must be reduced to normal level by discharcing steam when the foam formation happens until foom finishes,you must feed the boiler with water and you must make blowdown.

If you couldn't prevent foam,you must stop the boiler and you must search for the reasons.

D) FEED WATER OF THE BOILER

Feed water of the boiler must be revized by chemically.Water of the boiler must be analysed contiounus to prevent unexpected chemical condition.

The temperature of feed water and outlet pressure of pump must be supplied at required level.

The pipes of feed water of the boiler and feed pumps must be controlled continiously.

E) BLOWDOWN

Bottom blowdown must be done at least once in 8 hours operation (may vary according to conditions) by openinn the vlave for 4 sec.Blowdown must be done when the steam consumption is low. Blown down system must be checked periodically for leakages. Blowdowns must be recorded

Surface blowdown (TDS control) can be done by opening the valve contiously or can be done by calculation. Level indicators and controllers must be blowdown at least once a day

SHUTTING OFF THE BOILER

While discharcing the steam is reduced feed water must be reduced and flame must be lowered.

After the flame is extinquished,closing valve must be closed tightly.

If the water level is normal,feed water pump must be stopped and feed water inlet valve must be closed .

If the water level is too much higher than the normal level.Water must be discharged by blowdown afterwords the boiler must be cooled.

You should awoid fast cooling to prevent temperature differentiation in the boiler.

DISCHARCING

The pressure reducing is observed while the boiler is cooling.

The boiler can be discharged after water temperature becomes under 90° temperature and pressure finishes.

However,it is very dangerous to discharge the boiler when the boiler isn't cool enough.

Blowdown valves mus be closed tightly afterthe boiler discharges fully. And warning signs must be attached on the boiler.Indicating to open the blowdown valves.

OPERATING RULES FOR EXTRAORDINARY CONDITIONS

* Whatever the reason is,If the water level reduces under the water level indicators,the boiler must be stopped(If it's working with solid fuel,fuels must be discharged)and steam discharging must be closed.

After words,the reasons caused to reduce water level,must be investigated.

It is dangerous to give water to the hot boiler.You can feed water gradually after the boiler is getting cold.

1) Valves of burners must be closed,after the burner gets cold ignition electrade must be taken out.

2) The flame must be observed if the burner does not stop the fuel valve must be closed immediately.

3) The valve of fuel must be closed if the flame doesn't form in very short time at the first ignition.

You must ignite again after burner is ventilated.

PRECAUTIONS

* Do not fire th boiler when it has insufficient water.
* Do not put your hands or your head in during the the boileris burning and don't go in it during the boiler is burning.
* Do not close chimney damper fully.
* Bad chimney draft is harmful for human health and also bad chimney draft reduce the boiler effenciency.
* Chimneys must be clean ad well-kept for good burning.Before burning the boiler you should control the draft of chimney.
* Be careful at chimney and connectings of chimney's leakage.
* Cleaning door on the chimney connection mst be closed during burning.
* The doors of fume box and chimney cleaning door should not be opened certainly.
* Certainly do not open the doors of the boilers while the burner is on firing.
* Before firing the burner,be careful of existing burning materials in the boiler and be careful about cleaning of furnace.
* You must control the boiler during burning frequently.
* Do not cook any food in the boiler.
* Explosion door behind the boiler should able to be easly.Do not put anything in front of the door .Don't play with explasion door.
* Do not use fuel with high sulfur content and don't use materials in the boiler that that threates peoples's health.
* If you use the boiler with solid fuel,don't fire the boiler with gasoline,ethyl alcohol,spirit petrol,kerosene.And Don't put these materials around the boiler.
* Don't put explosive materials in the boiler
* Don't burn cake coal in the boiler.
* Discharge the coalfrom its bag and you feed the boiler with shave

Bags of coal are petroelum products so when it is burned,same harmful churns and tors can exist in your chimney.

* When you feed your boiler be carfeul about coal prill and be careful about spread of coals and quantity of coal because of efficintly burning .
* After feeding the boiler with fuel,you must close the doors of the boiler.
* Fuel must burn with enough oxygen for good burning.

Don't feed excessive coal in to the boiler not to cause to prevent taking enough oxygen.

Excessive feeding make coal grill have very short life.

* Please contact the qualified service company when you met extraordinary condition.

CLEANING AND MAINTENANCE

DAILY CLEANING AND MAINTENANCE

* You should discharge air (vacuum)of the water level indicator.
* You should control and clean water level controller of the boiler.
* You should mak blowdown a few times in a day.
* You should control the UV flame indicator.
* You should control the quantity of water in deaerator and feed water storage tank.
* You should control inlet pressusre and exit pressure by gas pressure regulator in gas ignition systems.
* All leaking flanges and connections in the water steam and fuel lines and on the boiler should be tightened and lekages must be premesed.
* You should control safety valve whether is opening easly or not.
* In the boilers with solid fuels,you should discharged the ashes everyday.

MONTHLY CLEANING AND MAINTENANCE

* You should control safety valve
* Water levelindicator switch and minumum water level switch must be conrolled at least in a month by reducing water level to minumum level slowly.
* The boiler and all systems of the boiler,pipe connectings,flanges,pot-holder,leakages of valves and other failures must be controlled very carefully.If there is a problem,you must note it.

* You sould clean all the filters
* You shoud clean the burner.
* You should tighten all flanges and connection and prevent leakages,if it is necessary, you can chargewith new.
* Power switch and switch system must be controlled by an electric technicion.
* Open the door of front fume box and clean fume pipes by brush 3-4 times in a month
* Clean front and back boxes and chimney connecting line from soots.

ANNUAL CLEANING AND MAINTENANCE

Discharge the boiler completely.Open all the man holes.Clean inside of the boiler. You can wash it with pressured water.clean the limes in the boiler.Afterwords you may wash the boiler.

You should revise monthly mainfaneonce.All bearings should be lubricated. Feed water pump and fuel pumps and should be revised.Man hales should be cosed and you should put new gasket.The boiler should be filled with water.

You should clean the chimney at least once in a year.

CLEANING AND MAINTENANCE

The perfect reference for the boiler worker is a clear and well-kept boiler room.

To supply high efficiency and to supply continuity depends on the boiler operator.

Expenses of cleaning and maintenance do not bring high costs.

If you clean as it is told the boiler will have very longlife,fuel economy and it will payback itself in a very short time.

All equipments that does not belongs to the boiler room must be removed from the boiler room by person in charge.

It is very important to use the boiler room without non relevent things.

There should be clean water connectings and dirth water connectings in the boiler room.

There shouldn't be any diffuculity for cleaning the boiler room wih water.

The boiler room must be one of the most beatiful place in the company.

CLEANING OUT OF THE BOILER

As all other technological equipments,3pass wet back scoth type boilers have to give very clean and good effect to people.

If the control equipments,bushing,flanges have no leakage there won't be any water and steam lekage anywhere at the boiler.So there won't be any salt and dirth in the boiler.

It is very important to squeezed all man holes and all flanges after two months If you don't squeeze all man holes and all flanges otherwise it will be impossible to avoid leakages.

CLEANING OF THE GAS SIDE

Opening fumes box's doors and connectings of burner is supplied to determineand solve dirties that are became over the boiler.

If soots layeris less than 0,5mm,you don't need to clean it.

Soot or dirt layer must be cleaned wit special boiler pipe brush.

Thick soot layer cause to drop eficieny of the boiler.

Hard layers can be seen on the weited heat surface by companents of soot and sulfur in the boiler that is worked very often in cold condition.

These layers are dangerous for the boiler's materials.

It must be cleaned in a very short time.It is not enough to clean with normal fume pipes' brush

A special cleaning equipments with electricity motor and special,playing heads are used for cleaning.

Before closing front doors again,MOLYKOTE must be applied on bolt and nuts.

CLEANING WATER SIDE

Man holes must be used to determine sediments on the water side.

The lime layer which is nearly 1mm on the water side of the boiler,not only drops the efficiency but also causes excess heatşng of materials .

Practisally,If you feed right feed water,to the boiler,lime formation on the heating surface will not occur.

In this case,the boiler must be cleaned with pressured water,If there is still lime in the boiler .You must clean with chemical cleaner.

Conderated water must always be controlled whiter it incluedes oil or not.You have to be careful about oil existing on the heating surface of the boiler.

PROTECTION THE BOILERS

A) PROTECTING WATER SIDE OF THE BOILERFOR LONG PERIOD OF TIME

If the boiler won't be used for along time,you should make the following processes to protect it from rust and corrosion;

Turnace;fumes pipes and fume gas side of miror plates must be cleaned at the boiler temperature approx 40°.

All surfaces of gas side of the boiler are cleaned with oil to prevet it to get in ouch with air.

The air must be dried by putting air drier chemicals in the boiler.

B) PROTECTING WATER SIDE OF THE BOILER FOR SHORT PERIOD OF TIME

During the boiler is out of service,the boiler have more rust and corrosion than during the boiler is in service.

If there is water with a little alkali and water with pas in the boiler,rust and corrosion emiloccur in the boiler.

If you don't take enough precautious for the boiler,even you discharge all water from the boiler,corrosion will be seen.

The boiler with no water can be prevented from corrosion.

külfetle korozyona karşı korumak mümkündür.

THE BOILER OUT OF SERVICE FOR ONE DAY

You must clase all the steam and the water valves on the boiler.

Before stopping the boiler,

You must mix high quantity sodium carbonate and sodium sulp hide to the boiler water for oxygen compound.

THE BOILER OUT OF SERVICE FOR ONE WEEK

The quantity of phosphate of the boiler water is raised by mixing 600 gr trisodium phosphate per m^3.

Safety precautions are taken by also mixing 700 gr hydrazine and 150 or 250 gr sodium sulfide to the boiler water to prevent rust and corrasions in the boiler.

Safety valve is adjusted as 0,2 kg/cm² to discharge out the rest of the oxygen. And water is filled to the boiler until water pass over the safety valve.

After the boiler is cool,water s filled and chemical materials are added and all valves are closed very tightly.

The temperature of the boiler room must not be dropped undertie +4°to prevent freezing.

The water of the boiler have to be discharged portly with blowdown in order to operate the boiler again.

After the qoiler must be filled again with normal rfeed water until water level.

Be careful;during operating the boiler again,quantity of Bo musn't be very high

MAINTENANCE OF THE EMPTY BOILER

If you don't use the boiler very longtimeiyou should keep it free of water.

All water in the boiler is discharged when the boiler is at the low pressure and hot by blowdown valve.

After you discharge the boiler,you open safety valve in order to discharge steam.

All man holes are opened and controlled wheather inside of the boiler is dry or not.

If it is wet,you should dry inside the boiler.

The pots have dimished lime and clorcalciu are putted in the boiler.You have to charge these pots every three months.

To eliminate the rest of oxygen in the boiler ,a burning pot with oil-lamp and fire wood is setted in the boiler.

After words,allman holes andvalves have to be closed.

All holes,flanges,all valves must be very tight to have no leakage.And all of them have to be controlled.

MAN HOLES MAINTENANCE

The doors of the man holes are placed with no cavity.

Before you place the gaskets,the gasket's sockets must be cleaned and the gaskets must be pull in the sockets.

The space between gaskets and their sockets must be equally placed.

Gaskets of the doors are tightened equally and gradually.

Be careful about gaskets quality and please use gaskets with graphic rubber,as best as should not be used.

Dimensions of gaskets should be choosen according to the dimensions of holes.

FEED WATER AND THE BOILER WATER

It is essential to eliminate risks at the water,stea lines and the boiler by working about feed water and boiler water.

These risks are as follow;

The heating surface of the boiler calcified be cause of hardness of water

It cause difficulties inheat transfer,drop efficiency,heat depasition,even at the end of this process;the boiler can be come scrap.

Oil and organic materials cause to stone heat by making thin layers on the heat surface of the boiler.

The most dangerous thing is miing oil in the boiler feed water.

Free oxygen and free carbon dioxide in the feed water and the boilerwater are weaken the materials of the boiler and make corrosion.

Mostly quantity of the boiler water activate evaporation is dry and calm in normally.

It causes to pollute pipe system,requipments,turbine and it causes to squeeze the equipments and make norrow cross-sections.

If there are high quantity of organic components in the water,water foams and evaporation is getting intormation.

TAKING SAMPLE OF THE BOILER WATER AND ANALYSIS

There is no standart water feed system,

Pure water is used for generating steam,its properties change from company to company.

The date of taking sample and quantity of sample must be corned.

It is enough to take sample only one time from places where water components change very fast.

The sample must be taken just after blowdown and the sample must be analized under the pressure by cooling

The sample pot must be clean.The sample pot must be shaken with the same sample before putting sample in.

You must close the opening of the sample pot.

You have to draw up a daily report about analysis and have to keep it.

At least 2 litres water must be caried in the clean pot or plass bottle.

THE FOLLOWING ANALYSIS ARE USEFUL FOR THE BOILER WATER

a)	Colour and appearonce	j) Sulphate
b)	Smell	k) P alkalinate
c)	Nitrit	l) M alkalinate
d)	Ammonia	m) Free chlorine
e)	Hardness	n) Magnesium
f)	pH	o) Chlorine
g)	Sediment	p) Ferro
h)	Conductivity	q) Silica
i)	Organic materials	r) Calsium

Pure water must be clear and purified from mechanical dirts.

The total quantity of manganese should'nt pass over 0,05 mg/kg in the water.

And the total quantity of ferro sholudn't pass over 0,2 mg/kg in the water.We need them to determine the supplying capasity of the water softener.

IT IS CUSTOMERS RESPONSIBILITY SO PROVIDE SUITABLE WATER CONDITIONS. OTHERWISE OUR GUARANTEE IS NO LONGER VALID.

You can use filter and manganese saving equipmenta and ferro saving equipments.

Check EN 12953-10 for detailed information of boiler water.

You can be sure that the your boiler will have long life If you use the boiler with rules in the user guide.

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